Wingwall #1 Installation Plan
for
State of Vermont Project: Jamaica ER-BRF 015-1 (23)

Town of: Jamaica, Vermont
County of: Windham

Prepared By:

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Jamaica ER-BRF 015-1 (23)

Overview

The Jamaica ER-BRF 015-1 (23) project involves the replacement of Bridge 30 which is located in the Town of Jamaica on Vermont Route 30, approximately 4.8 miles South of the Northern junction of Vermont Route 100 and 30. There is currently a temporary bridge in place, off alignment, that was installed after Tropical Storm Irene. The new structure will be approximately 132 feet in length with 243 feet of roadway work. This project also involves the replacement of an existing box culvert. The new precast concrete box culvert will be approximately 85 feet in length.

The existing temporary bridge approach and approach rail conflicts with the location of wingwall #1 on the southeast corner of the bridge.

In order to minimize disruption in traffic, Miller Construction, Inc. proposes that wingwall #1 be installed in two phases. The first phase includes the installation of a precast section of the wingwall from elevation 721.35 to elevation 729.65 spliced and grouted to the abutment prior to the approach slab placement. The second phase includes the installation of a cast-in-place wingtop from elevation 729.65 to elevation 733.00 after traffic has been routed onto the permanent structure.

Procedure

Phase 1:

Fabrication:

The rebar shop drawings have been detailed for abutment #1 to include stubs for the splicing of the precast structure using NMB Splice Sleeves.
These stubs shall be installed in abutment #1 prior to placement within a 5/16"+/- tolerance. It is imperative that the location of these stubs closely match the location of the NMB Splice Sleeves installed in the precast structure.
Additionally, a 3/4" coil rod anchor shall be cast into the abutment 0.59 feet above the bridge seat to accommodate a coil rod that will be installed to hold the structure in-place during the grouting operation.

The precast structure shall be formed and placed at a suitable location on-site. It shall include approximately 3 CY of High Performance Class A Concrete, as 2.59 feet of the in-place structure is above the bridge seat.
NMB Splice sleeves and PVC Grout Ports shall be installed prior to placement. The Grout Ports shall be installed so that the grouting operation takes place on the inside of the wingwall rather than the outside.
Additionally, a 10 foot long section of 1 inch PVC pipe shall be installed 2 feet from the top of the in-place structure so that a 3/4" coil rod can be installed to hold the structure in-place during the grouting operation.

Installation:

It is expected that excavation for, installation of, and backfilling for the precast structure will take one day. A complete flagger package shall be utilized to maintain one-way traffic on the temporary bridge. Jersey barriers may be required to separate the excavation from the flow of traffic, should traffic barrels not suffice.

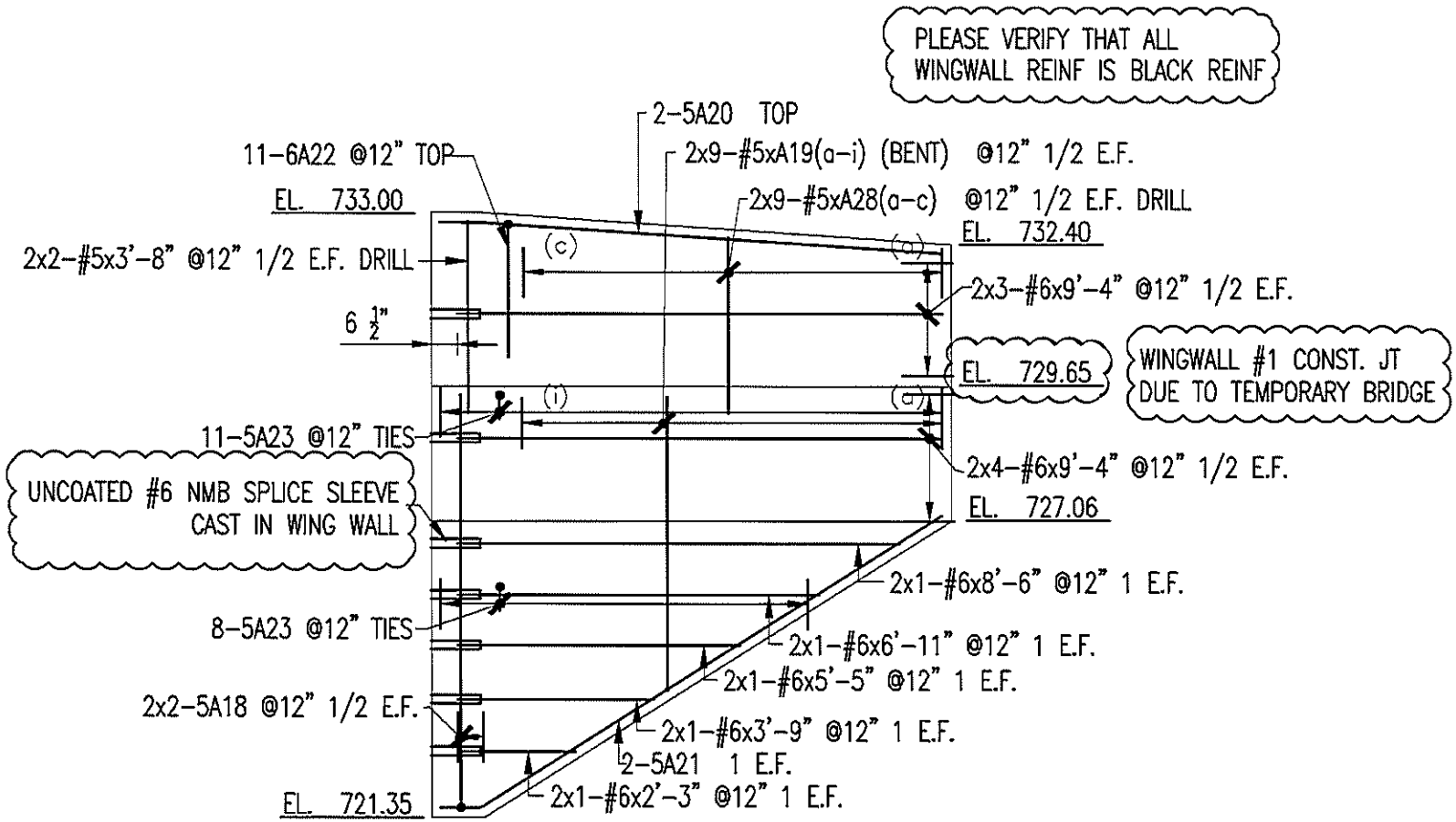
After removal of rail, sheeting, and excavation, the precast structure shall be hoisted into place. A 3/4" coil rod shall be threaded through the PVC sleeve and into the anchor located in the abutment. All NMB Splice Sleeves shall be aligned with the abutment stubs, and the coil rod shall be tensioned using a plate washer and heavy nut.
All splices shall be filled with SS Mortar grout with use of a hand pump. The joint between the abutment and wingwall shall be filled with epoxy. The plate washer and heavy nut shall also be sealed with epoxy at the edges to eliminate water infiltration into the PVC sleeve. Once the grout has cured, the coil rod is no longer a structural element therefore, corrosion of the rod is not a concern.
The wingwall shall carefully and evenly be backfilled after grout and epoxy installation so not to misalign the structure. After backfilling to grade and establishing to a pre-existing condition, the rail shall be re-installed and the temporary bridge will be released to two-way traffic.

Phase 2:

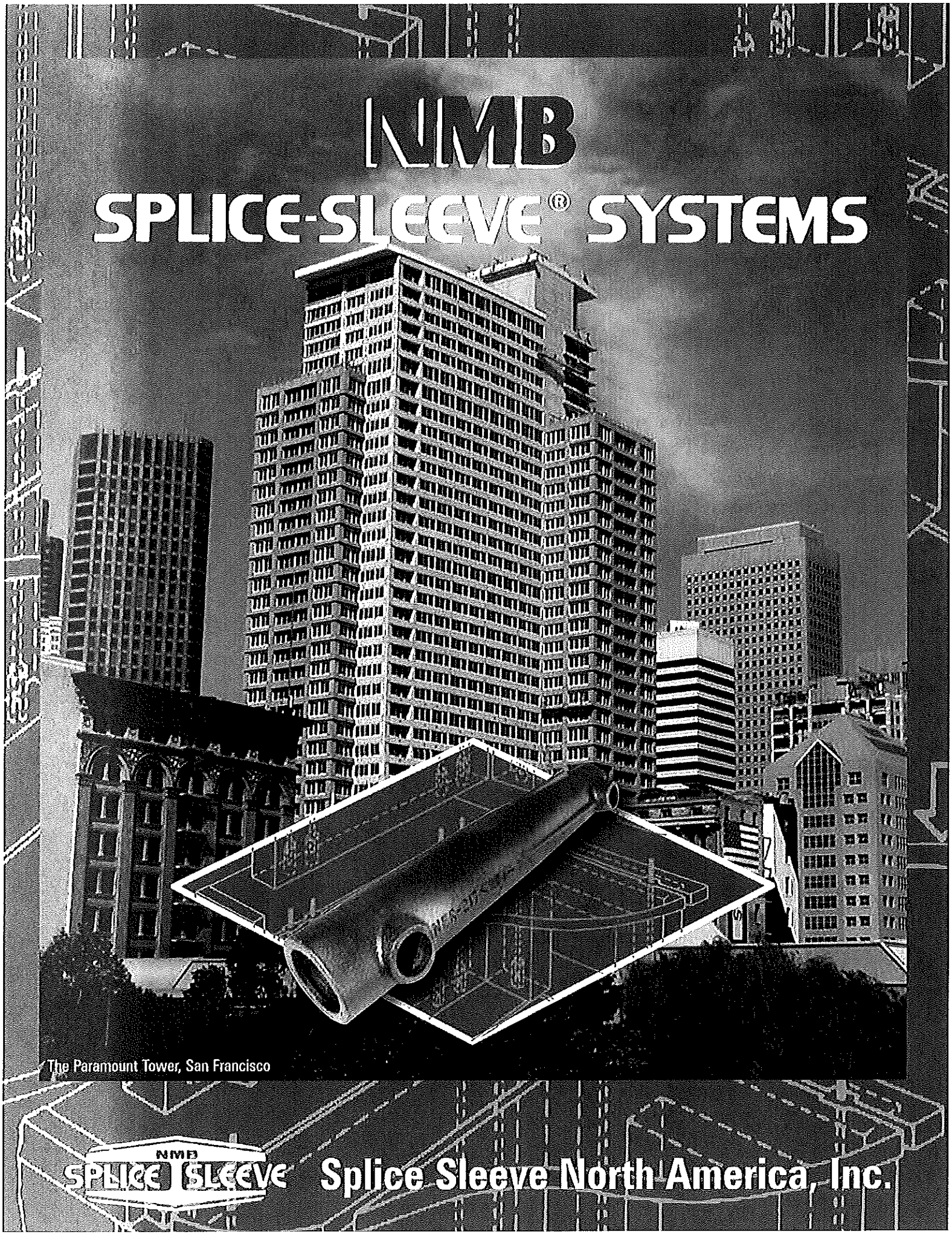
After the placement of the approach slab and traffic has been routed onto the permanent structure, the cast-in-place wingtop shall be installed.
Rebar shall be drilled and epoxied into the precast structure using Hilti RE-500.

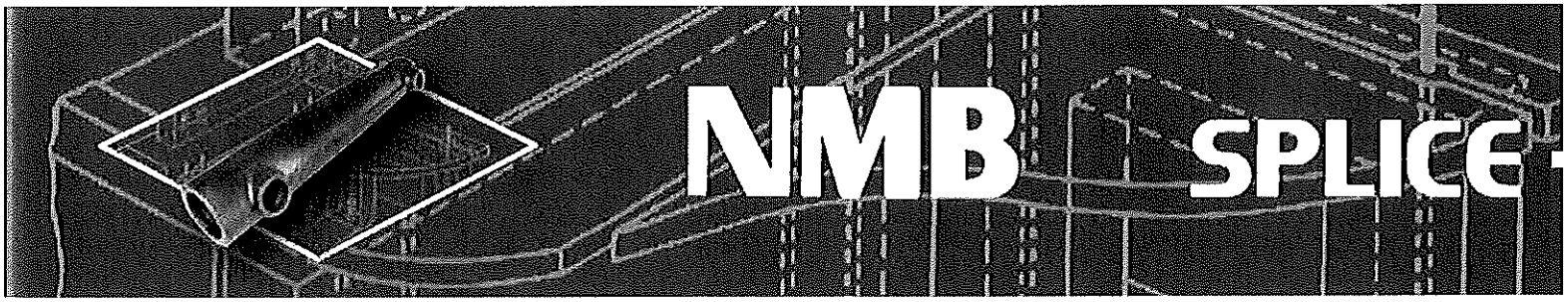
Contingency Plan

It is anticipated that the approach slab can be cast-in-place without disrupting two-way traffic on the temporary bridge. Should that not be the case, a plan shall be developed to install a section of precast approach slab using the same NMB Splice Sleeves and procedure.

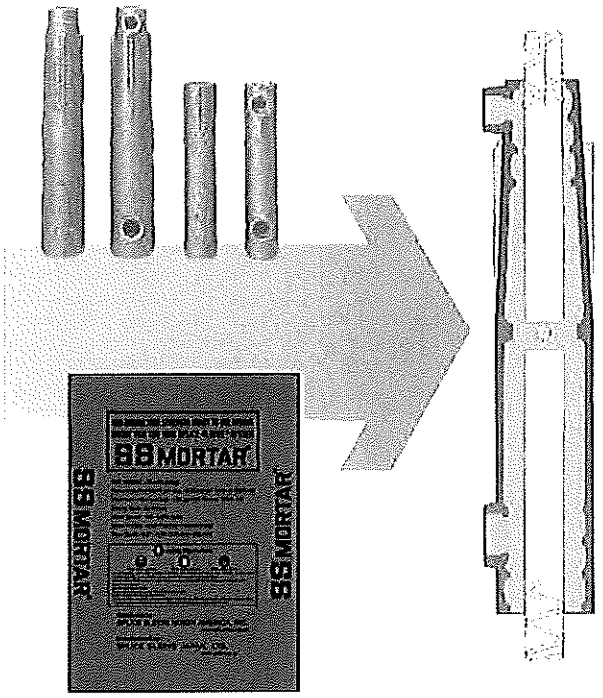


WINGWALL #1 ELEVATION

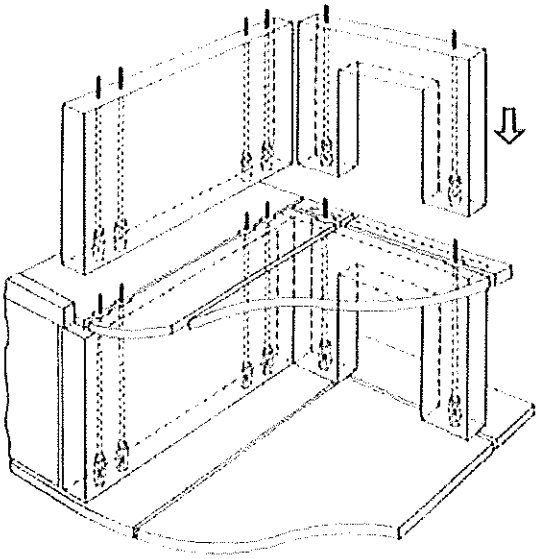

NMB
SPLICE-SLEEVE® SYSTEMS
The Paramount Tower, San Francisco
NMB
SPLICE SLEEVE
Splice Sleeve North America, Inc.

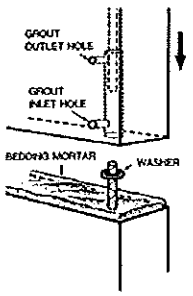


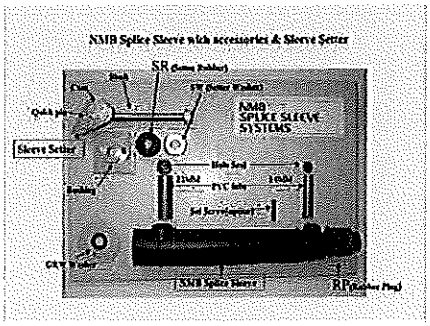
The NMB SPLICE-SLEEVE® is an efficient coupler for splicing reinforcing bars which uses a cylindrical-shaped steel sleeve filled with a Portland-cement based non-shrink high-early-strength grout. Reinforcing bars to be spliced are inserted into the sleeve to meet approximately at the center of the sleeve. The interior of the sleeve is then filled with SS MORTAR® grout. The resulting splices will develop tensile and compressive strengths in excess of the specified minimum for ASTM Grade 60 bars conforming to the ACI Building Code Requirements.



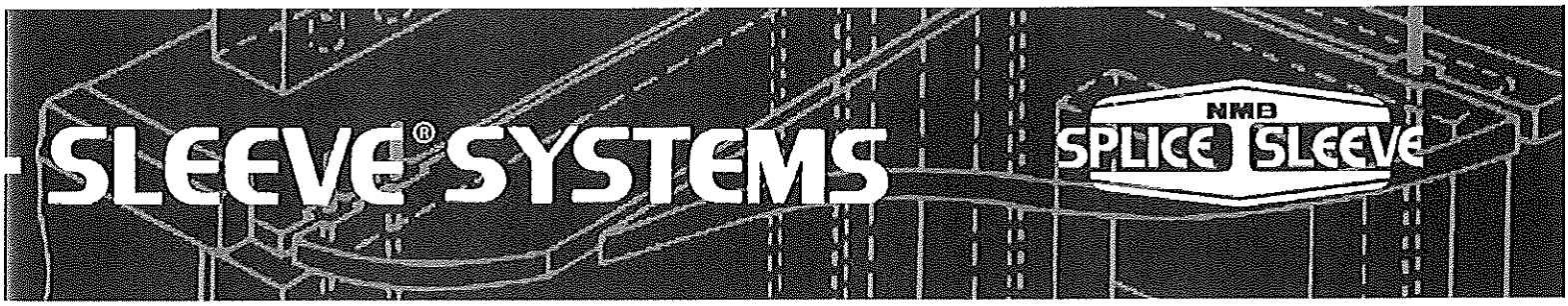
The NMB SPLICE-SLEEVE® is a proven method for connecting precast reinforced concrete structural members. At the precast plant, the sleeves are embedded precast element on one end of the main reinforcing bars to be connected. The bars protrude from the other end of the precast member. At the building site, the precast members are joined by inserting the protruding bars from the end of one precast member into the sleeves of the adjacent member. The sleeves are then grouted, in effect making the reinforcing bars continuous through the connection. This is called "Emulation" and the NMB is categorized as an emulative connection for precast systems. (Refer to ACI 550.1R-09 for more information).



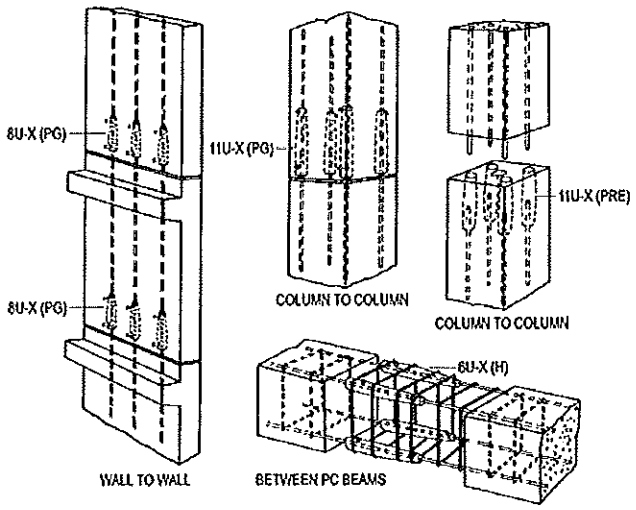




Patented Worldwide

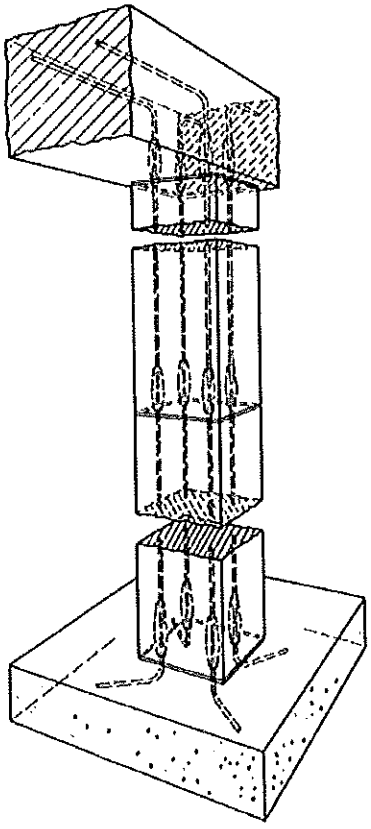


The NMB SPLICE-SLEEVE® is particularly appropriate for use in joining vertical precast concrete structural elements (columns and shearwalls). This is because the sleeve can be embedded completely in the precast elements at the manufacturing yard and when the elements are joined in the erection process, there is no need to make a closure pour or to perform other cosmetic patching after the bars are joined. This is sometimes referred to as a "blind" connection. When used in cast-in-place situations, the NMB SPLICE-SLEEVE performs the same function as other mechanical rebar splicing devices, basically that of extending the rebar length.



APPLICATIONS

NMB SPLICE-SLEEVES have been used in a number of different applications both in cast-in-place and precast concrete structures.

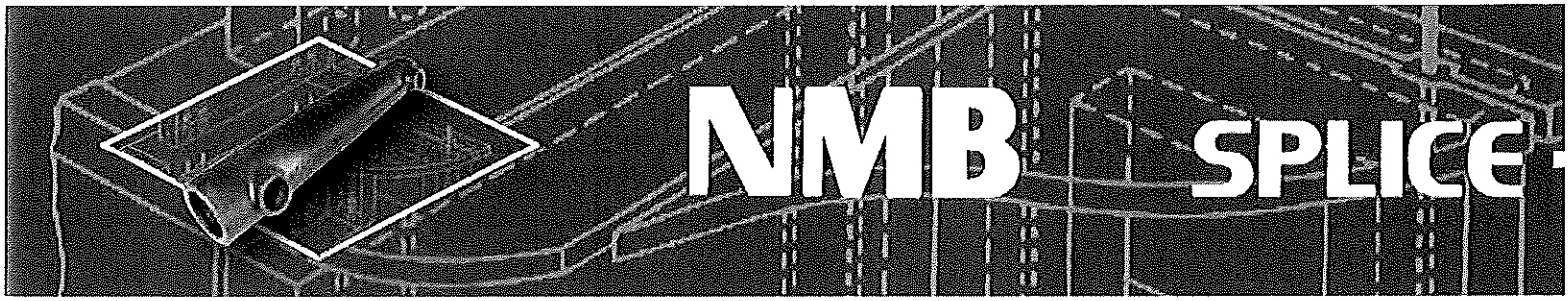


Precast Concrete Connections:

Column-to-column • Column-to-beam • Column-to-foundation
Beam-to-beam • Shear wall to shear wall • Shear wall to foundation
Elevator and stair cores • Airport control towers • Bridge piers and
Pier caps • Caissons • Large diameter hollow columns

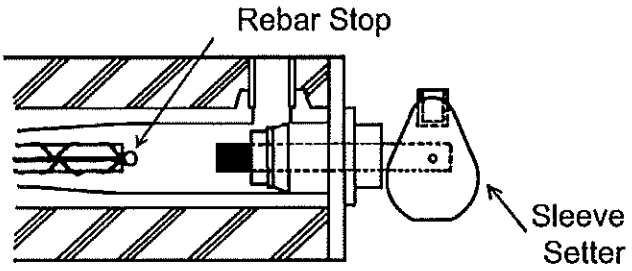
Cast-in-place Concrete Structures:

Connections of prefabricated column reinforcing cages
Connections of new bars to old in vertical and horizontal rehabilitation work
Stress relief joints in post-tensioned cast-in-place floor slabs



NMB SPLICE-SLEEVES are installed and held firmly in place in the forms during concrete pouring by means of a Sleeve Setter featuring a fast-acting cam operated locking device.

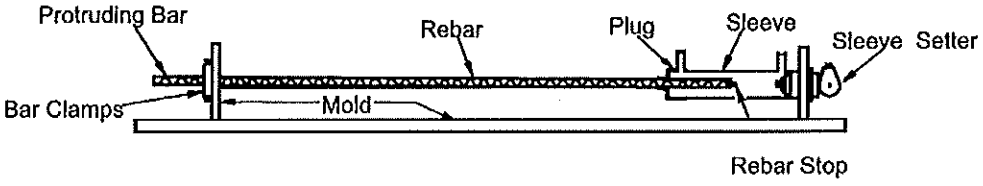
The NMB SPLICE-SLEEVE has an integral Rebar Stop in the mid-portion which assures the specified embedment of the rebar into the sleeve and an optional setscrew to hold the bar in the narrow end.



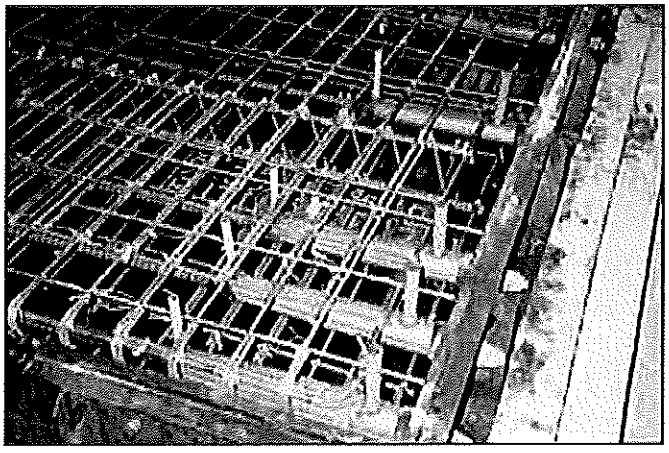
The uniform exterior dimension of the sleeve permits use of stirrups or hoops of the same size throughout the length of the sleeve.

No special treatment such as threading of rebar ends is required.

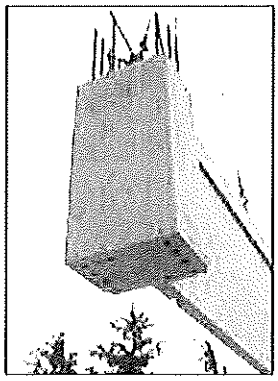
NMB SPLICE-SLEEVE can connect bars of the same size or any size smaller than the sleeve size.

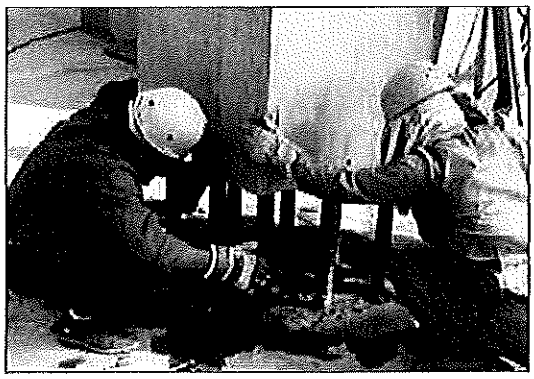


The NMB can be epoxy coated and used to connect epoxy coated bars without removing the coating.

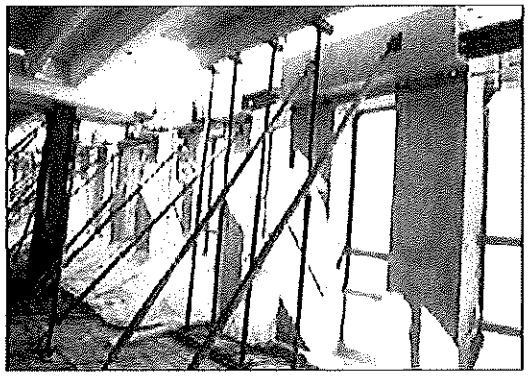


ERECTION



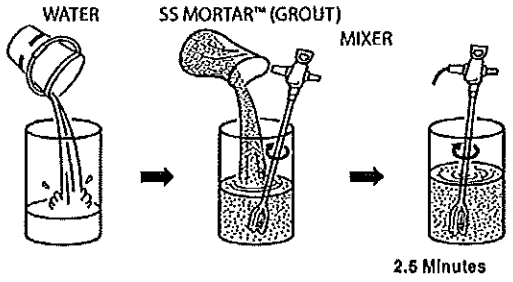


During erection, precast concrete elements are set into position where dowel bars are projecting either from foundation or lower precast concrete elements. NMB SPLICE-SLEEVES embedded in the upper precast elements receive those dowel bars. The wide (field) ends of the sleeves are designed to provide tolerances of ±5/16" (±8mm) for #5-6 sleeves, up to ±1/2" (±12.5mm) for the larger sleeves to accommodate bar misalignment. The new A11W allows ±3/5" (±15mm). If needed, Upsizing to a bigger sleeve size can gain additional tolerance. The precast elements are temporarily braced while the grout cures in the sleeves.



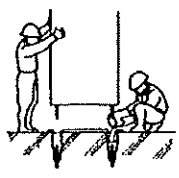
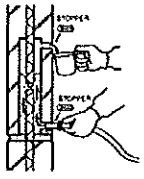
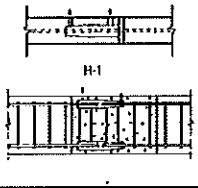
GROUTING

For PRE-GROUT applications, the SS MORTAR grout is simply poured into the sleeve and consolidated before the next precast member is set in position.



For POST-GROUT applications, the grout is pumped into the sleeve by means of a hand-operated pump. With the Post-Grout system, grouting operations can be performed anytime after bracing and do not interfere with erection progress.

Economy of crane and erection crew time can be improved because:

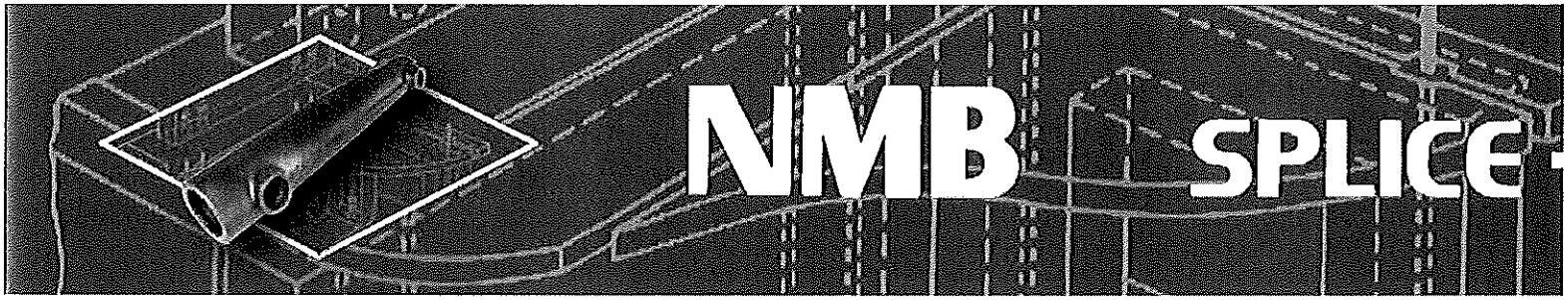
SYSTEM	PRE-GROUT™ PRE	POST-GROUT™ PG	HORIZONTAL H-1 & H-2
OPERATION			

Any size bar can be spliced with equal ease and in the same amount of time.

Any number of bars can be mated simultaneously.

Combinations of different sized bars can be readily spliced.

In total, NMB SPLICE-SLEEVE contributes to speed of construction.



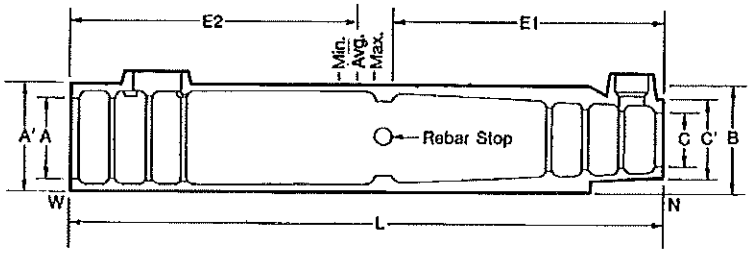
NMB SPLICE-SLEEVE

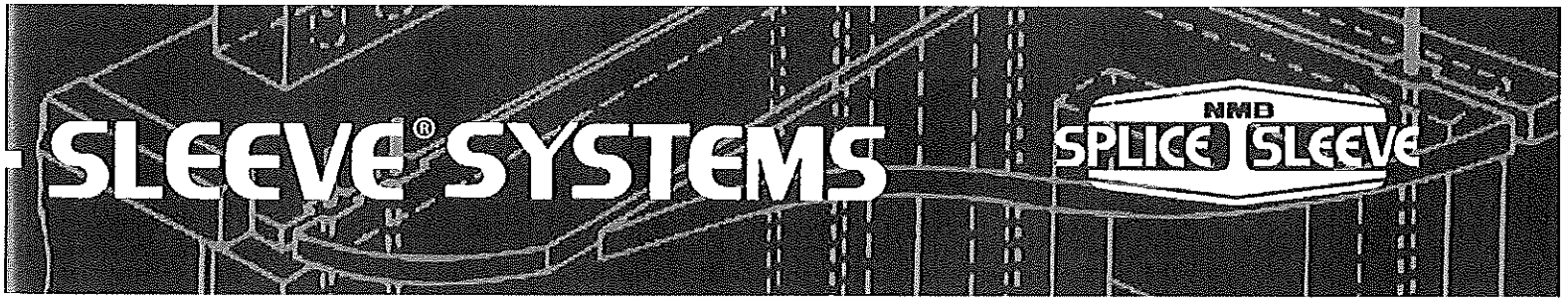
Steel Specification: The material properties of NMB SPLICE-SLEEVE conform to manufacturer's specification based on ASTM A536-85.

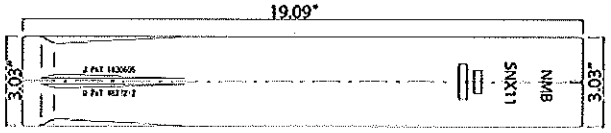
Grout Specification: The grout used in the NMB must be "SS Mortar". Minimum grout strength will be 6,500-psi for Type 1 (125%Fy) performance and 9,500-psi for Type 2 (150%Fy) performance.

Dimensions:

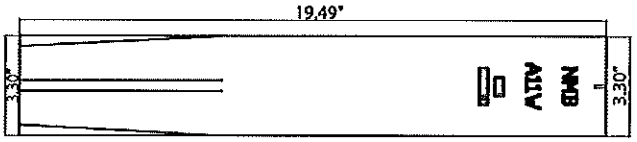
Dimensions of NMB Splice Sleeves											Recommended Rebar Embedment Length					
Sleeve No.	Bar Dia.	Bar Size		Sleeve Length (L) inch	Narrow End Diameter		Max. Dia. (B) inch	Wide End Diameter			Factory Dowel (E1) inch		Field Dowel (E2) inch			SS Mortar lbs. per Sleeve
		ASTM	Metric Canada		I.D. (C) inch	O.D. (C') inch		I.D. (A) inch	Total Tolerance inch	O.D. (A') inch						
											Minimum	Maximum	Minimum	Average	Maximum	
5U-X	0.625	#5	15MM	9.65	0.87	1.42	1.81	1.26	0.63	1.81	4.13	4.33	4.13	4.53	4.92	1.26
6U-X	0.750	#6	20MM	11.22	1.02	1.57	1.97	1.42	0.67	1.97	4.92	5.12	4.92	5.32	5.71	1.76
7U-X	0.875	#7		12.80	1.14	1.69	2.28	1.73	0.86	2.28	5.71	5.91	5.71	6.11	6.50	2.65
8U-X	1.000	#8	25MM	14.57	1.30	1.90	2.48	1.89	0.89	2.48	6.50	6.69	6.50	6.99	7.48	3.46
9U-X	1.128	#9	30MM	16.34	1.42	2.01	2.60	2.01	0.89	2.60	7.40	7.56	7.40	7.88	8.35	3.95
10U-X	1.270	#10		17.91	1.57	2.20	2.80	2.16	0.89	2.80	8.19	8.35	8.19	8.66	9.13	4.94
11U-X	1.410	#11	35MM	19.49	1.73	2.40	3.03	2.32	0.91	3.03	8.98	9.13	8.98	9.45	9.92	6.02
SNX-11	1.410	#11	35MM	19.09	1.69	2.52	3.03	2.32	0.91	3.03	8.86	9.25	8.27	8.86	9.45	5.71
A11W	1.410	#11	35MM	19.49	1.73	3.31	3.30	2.60	1.19	3.31	8.86	9.84	8.27	8.96	9.65	6.99
14U-X	1.693	#14	45MM	24.41	2.01	2.80	3.46	2.60	0.91	3.46	11.42	11.61	11.42	11.91	12.40	9.19
18U-X	2.257	#18	55MM	36.22	2.68	3.66	4.72	3.27	1.01	4.25	17.00	18.11	17.00	17.56	18.11	25.31







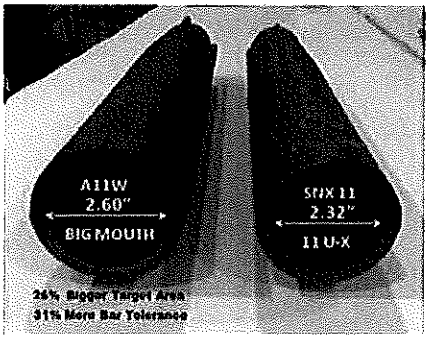
NEW PRODUCTS!



SNX 11

- US PVC grout tubes 3/4" inlet & 1/2" outlet
- Screw in Rubber Plugs
- 9/11 RP for upsizing
- More Tolerance

A11W



How to specify NMB SPLICE-SLEEVES:

SPECIFIC: Show sleeve size and grouting system.

Examples: NMB SPLICE SLEEVE 8U-X(PG), 11 U-X (PRE) from Splice Sleeve North America, Inc. Livonia, Michigan.

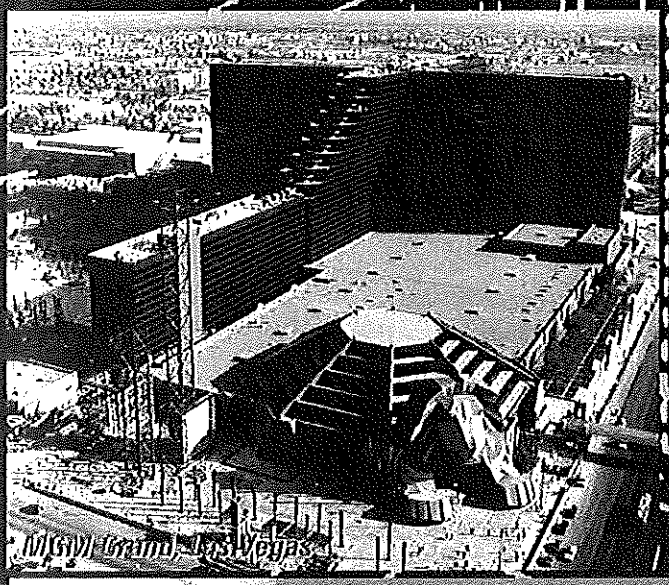
GENERIC: Mechanical rebar splices by means of grout-filled steel sleeves with frusto-conical geometry into which a non-shrink, high-strength grout is introduced using a low pressure pump, the splice to meet the TYPE 1 or 2 requirements of ACI 318.

AASHTO:

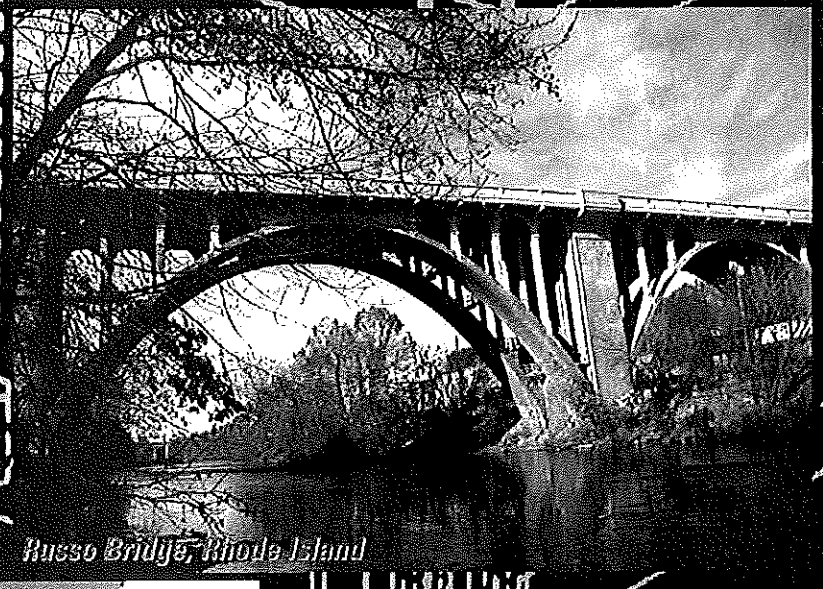
The NMB SPLICE-SLEEVE exceeds the requirements (min. 125%Fy) of the AASHTO, Standard Specification for Highway Bridges, Division I- Design, Section 8.32.2. This article sets down requirements for fatigue design of mechanical connections. The NMB is listed generically as the "Grout-filled sleeve (without threaded ends), with or without epoxy coated rebar", which gains the 18-ksi stress category (highest) under 5 million cycle testing per NCHRP 10-35 methodology.

APPROVAL AND RECOGNITION

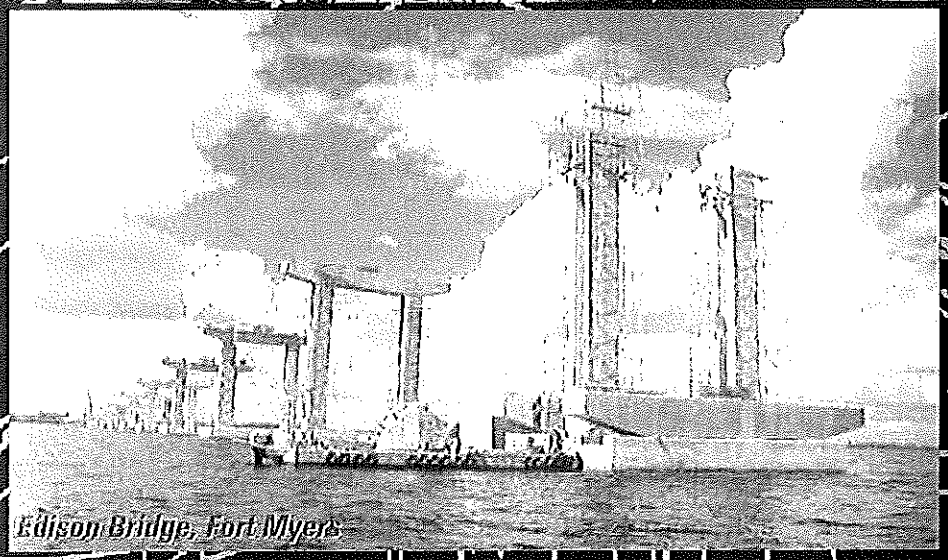
- Evaluation Report ER-5645: ICC Evaluation Service, Inc.
- New York City Board of Standards and Appeals, Calendar No. 329-89-SM
- City of Los Angeles, Departments of Building and Safety, Research Report: RR25385
- Various U.S. State Department of Transportation
- Building Center of Japan, Ministry of Construction
- Housing Development Board, Singapore
- Ministry of Works and Development, New Zealand



MGM Grand, Las Vegas



Russo Bridge, Rhode Island



Edison Bridge, Fort Myers

FAA Control Tower, Orlando

Tennis Stadium, Yale University

Mystic Garage, Medford, MA

NMB SPLICE SLEEVE

Splice Sleeve North America, Inc.
38777 W. Six Mile Road, Suite 106
Livonia, Michigan 48152
For More Information, Call: 734-838-0420
On the Web: www.splicesleeve.com

BASF

The Chemical Company

PRODUCT DATA

3 03 62 16 **Metallic Non-Shrink Grouting**

SS MORTAR®

Splice-sleeve grout

Description

SS Mortar® is a cement-based metallic-aggregate mortar for grouting of NMB Splice Sleeves. This nonshrink, high-strength, ready-to-use grout is used for NMB Class-1 and Class-2 splice sleeves.

Yield

One 55 lb (25 kg) bag of SS Mortar® mixed with 8.25 lbs (3.75 kg) of water, produces approximately 0.42 ft³ (0.012 m³) of material.

Packaging

55 lb (25 kg) multi-wall paper bags

Shelf Life

1 year when properly stored

Storage

Store in a cool, clean, dry environment.

Features	Benefits
• Extended working time	Allows for ease of placement
• Can be installed from 40 to 90° F (4 to 32° C)	Apply over a wide range of temperatures and conditions
• Can be pumped or poured	Facilitates rapid placement
• Hardens free of bleeding, settlement, or drying shrinkage	Lessens weather dependency

Where to Use

APPLICATION

- NMB splice-sleeve mechanical connectors for Class-1 and Class-2 sleeves; the purchaser should specify the type of coupler being grouted

How to Apply

Surface Preparation

1. For pre-grout applications, ensure that the splice sleeves are clean and free of all debris, water, and any other foreign matter before starting grouting operations.

2. For post-grout applications, remove the hole seals in the grout inlet and outlet tubes and inspect for blockage. Inspect the sleeves and grout tubes with a bright light to ensure there are no foreign materials or obstructions. Blow air through the sleeves using the inlet or outlet tube to verify there are no obstructions.

Temperature

1. Store and mix mortar to produce the required mortar temperature under jobsite conditions. Use warm water in cold weather and cold water in hot weather. Ideally, the splice sleeve or substrate should be in the 50 to 90° F (10 to 32° C) range. Mixed mortar temperatures should also fall between 50 and 90° F (10 and 32° C).

Recommended Temperature Guidelines

PREFERRED RANGE 50 – 80° F (10 – 27° C)

	MINIMUM °F (°C)	MAXIMUM °F (°C)
Splice sleeves	40 (4)	90 (32)
Mixing water	40 (4)	90 (32)
SS Mortar® as mixed and placed	50 (10)	90 (32)

CAUTION: When grouting at minimum temperatures, see that the splice-sleeve and grout temperatures do not fall below 40° F (4° C) until after final set. Protect the grout from freezing (32° F [0° C]) until it has reached 1,500 psi (10.3 MPa) compressive strength. Excessive grout temperatures may result in difficult pumping and premature stiffening.

Technical Data

Composition

SS Mortar® is a hydraulic cement-based metallic-aggregate mortar.

Compliances

- ICBO requirements for Type II couplers

Test Data

PROPERTY	RESULTS	TEST METHODS
Compressive strengths, psi (MPa), at 70° F (21° C)		ASTM C 942
1 day	4,000 (28)	
3 days	5,400 (38)	
7 days	7,000 (49)	
28 days	11,000 (76)	
Typical flexural strengths, psi (MPa)		ASTM C 348
7 days	1,000 (6.9)	
28 days	1,100 (7.6)	

The data shown are based on controlled laboratory tests. Expect reasonable variations from the results shown because of varying temperatures and atmospheric conditions at the jobsite. Control field and laboratory tests on the basis of the desired placing consistency rather than strictly on water content.

Consistency

Description of flow test

Use the BASF Flow Guide that consists of a 2 by 4" (51 by 102 mm) cylinder placed in the center of a level, smooth, nonabsorbent surface. The cylinder is filled with SS Mortar® level with the surface and immediately but slowly lifted until the SS Mortar® is discharged. Measure the diameter of the spread in two locations perpendicular to one another and take the average of the two readings. The BASF Flow Guide is available from BASF but may also be assembled on the jobsite using rigid, non-absorbent materials.

Flow tests were run using the BASF Flow Guide at a spread of 5 – 6" (127 – 152 mm).

Mixing

1. Use potable water only. For mixing grout, use an electric drill with a mixing blade or a horizontal-shaft mortar mixer. Do not mix by hand. Do not add cement, sand, aggregate, admixtures, or other additives unless specifically advised in writing by BASF Technical Service.

2. The amount of water needed to produce the desired consistency will depend upon mixing time, the type of mixer, the temperature of the grout following mixing, and the size of the batch. A batch should contain increments of full bags. The recommended field consistency is 5.0 – 6.0" (127 – 152 mm) as determined by the use of the BASF Flow Guide.

3. The suggested amount of mixing water for the initial trial mix to produce this flow is 12 – 15% by weight of SS Mortar® or 1 gallon (8.34 lbs) [3.8 L or kg] per 55 lb (25 kg) bag.

4. If additional water is required to meet the consistency specification, it should not result in a BASF Flow Guide diameter of greater than 6.5" (165 mm), and the total water content of the mix should not exceed a maximum of 17% by weight of SS Mortar or 1.1 gallon (9.36 lbs) [4.2 L or kg)] per 55 lb (25 kg) bag.

5. As the first step in mixing, place all water into the mixing pail, then pour all of the SS Mortar® into the pail while stirring it with a high-speed mixer. The water requirement should be established in a test batch. After all materials are put into the pail, mix grout for a minimum of 5 minutes or longer, if required, for a uniform mixture. After the grout has been mixed, use it within 30 minutes. Do not retemper grout by adding water and remixing after it stiffens.

6. The BASF Flow Guide for SS Mortar® is designed for placement at a spread of 5 – 6" (127 – 152 mm) (maximum of 6.5" (165 mm) when a cylinder of nominal dimensions—2" (51 mm) in diameter by 4" (102 mm) in length—is filled and lifted off a nonabsorbent flat surface (such as a BASF Flow Guide). The exact amount of water needed will depend upon the temperature of the grout following mixing and the size of the batch mixed, but it should not be greater than 17% of the total mix by weight. Warm mixing water, not exceeding 90° F (32° C), may be used either with cold grout or with placements at the lower temperature limit of 50° F (10° C).

Application

1. In pre-grout applications, pour the grout continuously into the sleeve and rod with a small diameter rod (such as a welding rod) to remove any entrapped air.

2. In post-grout applications, pump the grout into the inlet tube until it flows freely without air bubbles from the outlet tube. Seal the outlet tube with a rubber stopper of the proper size. Remove the pump nozzle from the inlet tube and immediately seal the inlet tube with a rubber stopper to avoid any loss of grout.

3. Following grouting operations, remove the filling connections and verify the absence of any voids and trapped debris.

Curing

Cure all exposed grout by wet curing for 24 hours and then applying a recommended curing compound compliant with ASTM C 309 or preferably ASTM C 1315.

For Best Performance

- The water requirement may vary with mixing efficiency, temperature, and other variables.
- Do not add plasticizers, accelerators, retarders, or other additives unless advised in writing by BASF Technical Service.
- Contact your local representative for a pre-job conference to plan the installation.
- Store SS Mortar® in a dry area at a controlled temperature (50 to 90° F [10 to 32° C]). Mix SS Mortar® to produce the desired mixed-grout temperatures under jobsite conditions. Material may be stored warmer for cold-weather applications or cooler for hot-weather applications.
- Ideally, the splice sleeve or substrate should be in the 50 to 90° F (10 to 32° C) range. The temperature of the mixed grout should fall between 50 and 90° F (10 to 32° C). Consider using heated water in cold weather or chilled water in hot weather to help adjust the mixed grout temperature.
- When grouting at minimum temperatures, see that the splice sleeve and grout temperatures do not fall below 40° F (4° C) until final set and that the grout is protected from freezing (32° F [0° C]). Maintain heat until the grout in the sleeves has reached a minimum of 1,500 psi (10.3 MPa) compressive strength as determined by 2" by 2" by 2" (51 mm) restrained cubes (ASTM C 942 or ASTM C 1107) in metal cube molds. Grout temperatures outside the recommended range may result in difficulty pumping and premature stiffening.
- An authorized laboratory should perform testing of SS Mortar®; conduct sampling at the jobsite. Follow ASTM C 942 or ASTM C 1107 for sampling, fabrication, storage, and curing of specimens. Samples must be moist cured or cured under water at the jobsite for 24 hours before transfer to the laboratory for wet or moist-room curing. Samples may be tested to determine early strength gain to determine when the sleeves have developed sufficient strength to remove temporary supports or to determine compliance with project requirements. Consult your local BASF representative for additional information.
- Do not use if bag is damaged.
- Make certain the most current versions of product data sheet and MSDS are being used; call Customer Service (1-800-433-9517) to verify the most current versions.
- Proper application is the responsibility of the user. Field visits by BASF personnel are for the purpose of making technical recommendations only and not for supervising or providing quality control on the jobsite.

Health and Safety

SS MORTAR®

Caution

Risks

Eye irritant. Skin irritant. Causes burns. Lung irritant. May cause delayed lung injury.

Precautions

KEEP OUT OF THE REACH OF CHILDREN. Avoid contact with eyes. Wear suitable protective eyewear. Avoid prolonged or repeated contact with skin. Wear suitable gloves. Wear suitable protective clothing. Do not breathe dust. In case of insufficient ventilation, wear suitable respiratory equipment. Wash soiled clothing before reuse.

First Aid

Wash exposed skin with soap and water. Flush eyes with large quantities of water. If breathing is difficult, move person to fresh air.

Waste Disposal Method

This product when discarded or disposed of is not listed as a hazardous waste in federal regulations. Dispose of in a landfill in accordance with local regulations.

For additional information on personal protective equipment, first aid, and emergency procedures, refer to the product Material Safety Data Sheet (MSDS) on the job site or contact the company at the address or phone numbers given below.

Proposition 65

This product contains materials listed by the state of California as known to cause cancer, birth defects, or reproductive harm.

VOC Content

0 lbs/gal or 0 g/L.

For medical emergencies only, call ChemTrec (1-800-424-9300).

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